

Virtual Furniture Using Augmented Reality

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Abstract: In today's world information and communication technology supports the development of human interaction with physical, computer and virtual environment such as science, commercial, banking, education, etc. Augmented reality is a field of computer research which deals combination of reality with computer related data. In early days if we users wanted to buy a furniture objects without visiting the shops it was possible but it was not possible to check how the object actually looks in home structure. Now in our proposed system, it is possible for user to buy the furniture objects sitting in the home without visiting the shops. The main purpose of the project is to develop a windows application for trying different furniture in virtual way. The application will eliminate the human efforts by physically visiting the furniture store which is very time consuming activity.

Keywords: Augmented Reality, Marker Detection, Rendering, Image Processing.

I. Introduction

Augmented reality is a technology within which we can see the objects in physical world virtually, thus providing a composite view. It gathers a wide variety of user experiences. We are going to develop a system with augmented reality that lets user to try on virtual furniture in user's real home structure before buying. From this user will be able to choose furniture objects a lot easier. It will not be necessary to go shopping and long searching for the large user need, or use a measure tape to find out whether or not the furniture would fit in customer's room or not. The main purpose of this project is to develop an application for various furniture items in furniture stores virtually without using the actual means that is incredibly exhaustive and time consuming activity. By using this application it will be convenient for the user to do online shopping of furniture items. This will additionally help the user to try out the furniture items in their room and they will be able to see how it will look after placing furniture in it. User can attempt multiple combination of furniture objects virtually without physically moving the furniture items. Our motivation here is to increase the time efficiency and additionally improve the accessibility of furniture try on by making this layout in augmented reality.

II. Existing System

The application which are currently being used are slower in image capturing & provide low resolution, which further degrades the user experience and user faces problems & has to wait for the image to process properly, even the graphics of the objects used for furniture are lower in resolution.

III. Problem Statement

The user will be able to see the furniture virtually in their home structure instead of going for the physical labour of purchasing and placing the furniture in their home environment. The basic problem faced by the customer is that they have to take measurement & check for the proper size of the product that fits their home environment our application will allow the user to view the product they want to purchase according to their needs & home environment.

IV. Proposed System

A web based application where user, have to place the marker in a room where they want to try out furniture items. The user's webcam will be on and through the webcam they will capture the live feed of the room. Application captures the image and passes through predefined marker detection algorithm. Algorithm is based on image processing techniques using color and other properties as the input to detect the marker. User initially selects the furniture to be placed from the given database. The application superimposes furniture on the original image with the center coinciding with the markers center in both directions. Furniture objects are overlaid on to the two dimensional image frame acquire from webcam. This will appear as if it is actually placed in the real world. And finally the user can view how the area looks with the furniture present.

V. Project Design

1. Implementation design [3]:

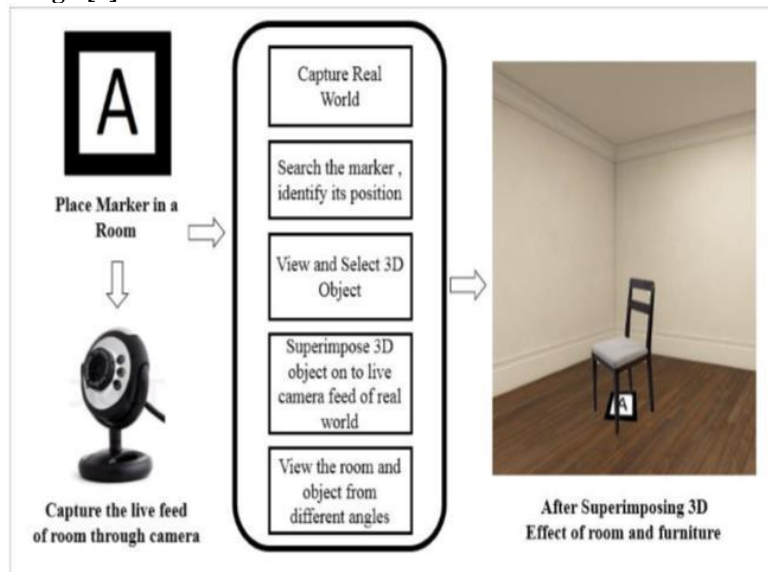


Figure 1: Implementation of Placing Marker and Capturing the live feed of room.

The above project design [3] explains the working of the project. The user which has been approved by the admin is intended to use facilities like capturing the image from the marker & selecting the intended product they want to purchase. The main focus is to allow the user to view the product in the home environment allowing them to make purchase decisions regarding the furniture product.

2. Flowchart:

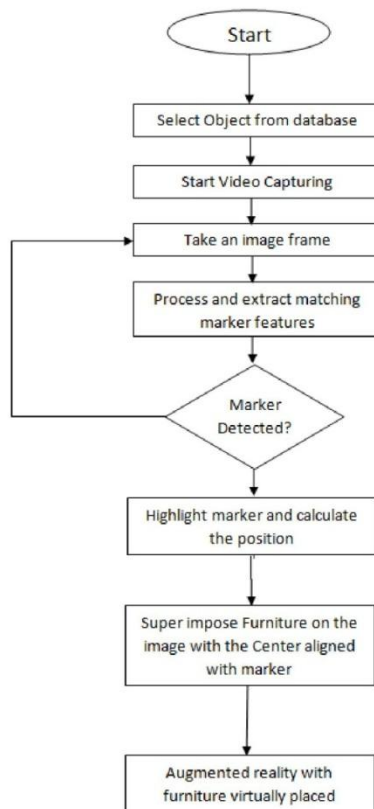


Figure 2: Project Flowchart

The above flowchart explains the actual flow of project. Firstly, the new user needs to select which product he/she intends to purchase & accordingly select the product from the main page. After selecting the product by the user an window will pop up which will access their camera. The marker should be placed after the camera has been opened on the users device, the marker should be placed in such a way that the user is able to view it in an proper angle, the user has to place the marker in their home environment where they want to view the product. After viewing they can even change the product if they want to view any other or else exit it.

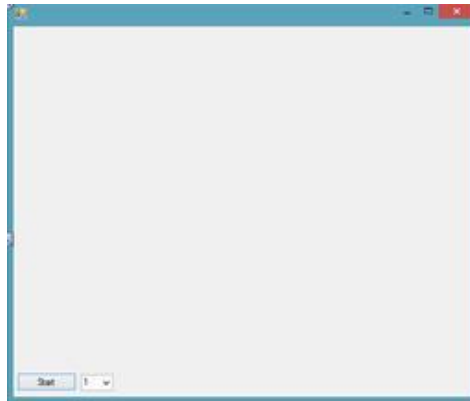


Figure 3: Providing Camera Access to User



Figure 3: Marker Detection

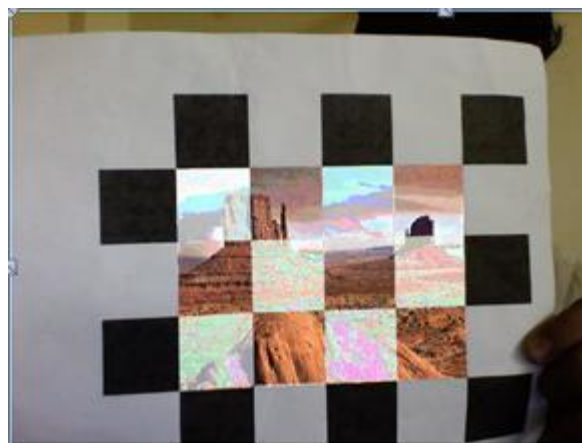


Figure 4: Image Processing

VI. Marker Detection

AR marker is such a symbol or image that a computing system will detect from a video image using image processing, pattern recognition and computer vision techniques. Once detected, it then defines both the proper scale and pose of the camera. This approach is termed as marker-based detection. The primary goal of a marker detection method is to find out the outlines of potential markers, and then to deduce locations of marker's corners within the image. Additionally, detection system must ensure that it really must be a marker and decipher its identity. Finally, the system calculates the pose using the data from the detected marker location

The basic marker detection method consists of the following steps:

1. Image acquisition: The acquisition of an intensity image.
2. Preprocessing Low level image: Processing Line detection or line fitting Detection of the corners of the marker.
3. Detection of potential markers and discard of any obvious non-markers: Fast rejection of obvious non-markers and Fast acceptance test for potential markers.
4. Identification and decoding of markers: Identify the template matching (template markers) and Decoding (data markers).
5. Calculation of the marker position Estimated.

Application works as follows:

1. The camera captures the live video feed of the real world and sends it to the application.
2. Application goes on searching through each video frame for any square shapes.
3. If any of the square shapes are found, then the application calculates the position of the camera relative to the black square.
4. Once the position of the camera is calculated a computer graphics model is drawn from that same position.
5. This model is drawn on top of the live video feed of the real world and so it appears stuck on the square shaped marker.
6. The final output is process and shown back through the handheld display, and thus when the user looks through the display they see graphics overlaid on the real world.

VII. Rendering

Rendering module consists of two inputs. First, it calculates the position of the marker and selects among the dataset objects and second the selected 3D object is imposed on the calculated position of the marker.

VIII. Future Scope

In future our project dataset and scope will be scalable. The user might not only be able to try out different furniture objects but they can also try out this application by trying on garments, goggles, watches, hair styles etc. It can also be used for various applications in shopping malls, interior designing, Medical Science etc.

IX. Conclusion

This system will help and assist the customer to view the furniture object virtually in real environment before buying the object. Due to these system customer will come to know how their home structure would look after purchasing and placing the furniture object. This proposed system would let the user to try on multiple combinations of object virtually without physically moving the furniture objects. These will help the buyer in determining how to setup the furniture in their home structure.

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